

# **Exhibit 3**



US005919302A

**United States Patent** [19]  
**Falster et al.**

[11] **Patent Number:** **5,919,302**  
[45] **Date of Patent:** **Jul. 6, 1999**

- [54] **LOW DEFECT DENSITY VACANCY DOMINATED SILICON**
- [75] Inventors: **Robert A. Falster**, Milan, Italy; **Joseph C. Holzer**; **Steve A. Markgraf**, both of St. Charles, Mo.; **Paolo Mutti**, Merano, Italy; **Seamus A. McQuaid**; **Bayard K. Johnson**, both of St. Louis, Mo.
- [73] Assignee: **MEMC Electronic Materials, Inc.**, St. Peters, Mo.
- [21] Appl. No.: **09/057,851**
- [22] Filed: **Apr. 9, 1998**

**Related U.S. Application Data**

- [60] Provisional application No. 60/041,845, Apr. 9, 1997.
- [51] **Int. Cl.<sup>6</sup>** ..... **C30B 33/06**
- [52] **U.S. Cl.** ..... **117/3; 117/15; 117/20; 117/201; 117/932**
- [58] **Field of Search** ..... **117/3, 15, 20, 117/201, 932**

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*Primary Examiner*—Benjamin Utech  
*Assistant Examiner*—Kim-Chan Chen  
*Attorney, Agent, or Firm*—Senniger, Powers, Leavitt & Roedel

[57] **ABSTRACT**

The present invention relates to single crystal silicon, in ingot or wafer form, which contains an axially symmetric region in which vacancies are the predominant intrinsic point defect and which is substantially free of agglomerated vacancy intrinsic point defects, wherein the first axially symmetric region comprises the central axis or has a width of at least about 15 mm, and a process for the preparation thereof.

**40 Claims, 22 Drawing Sheets**

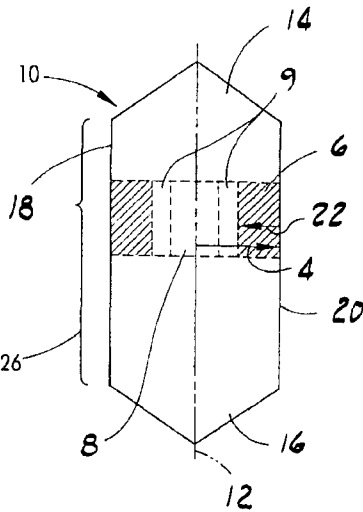


FIG.1

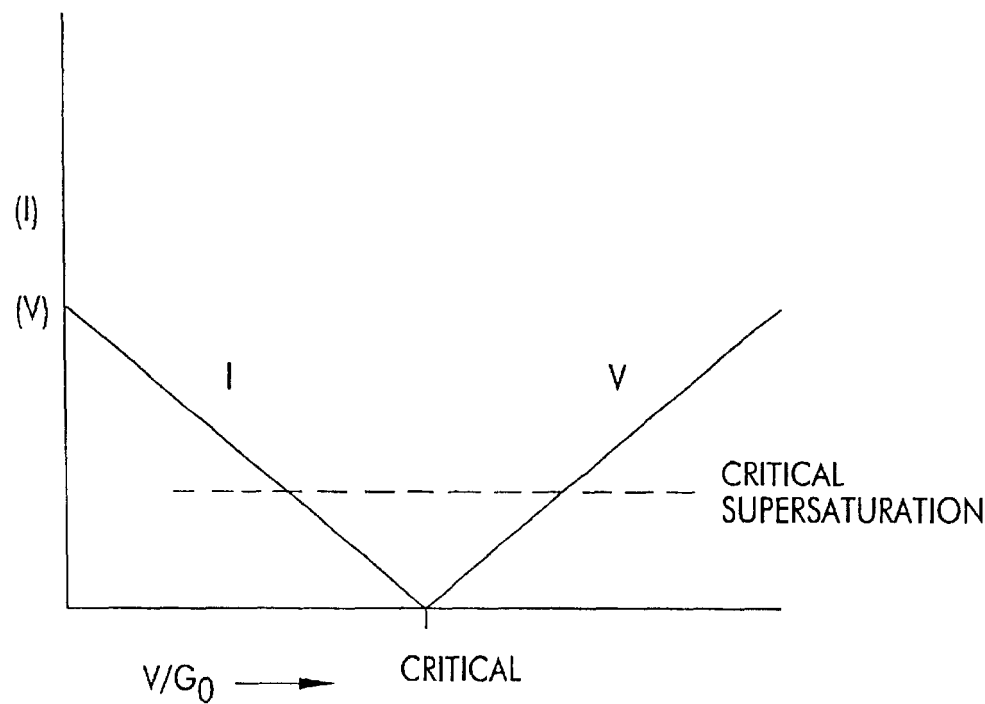


FIG.2

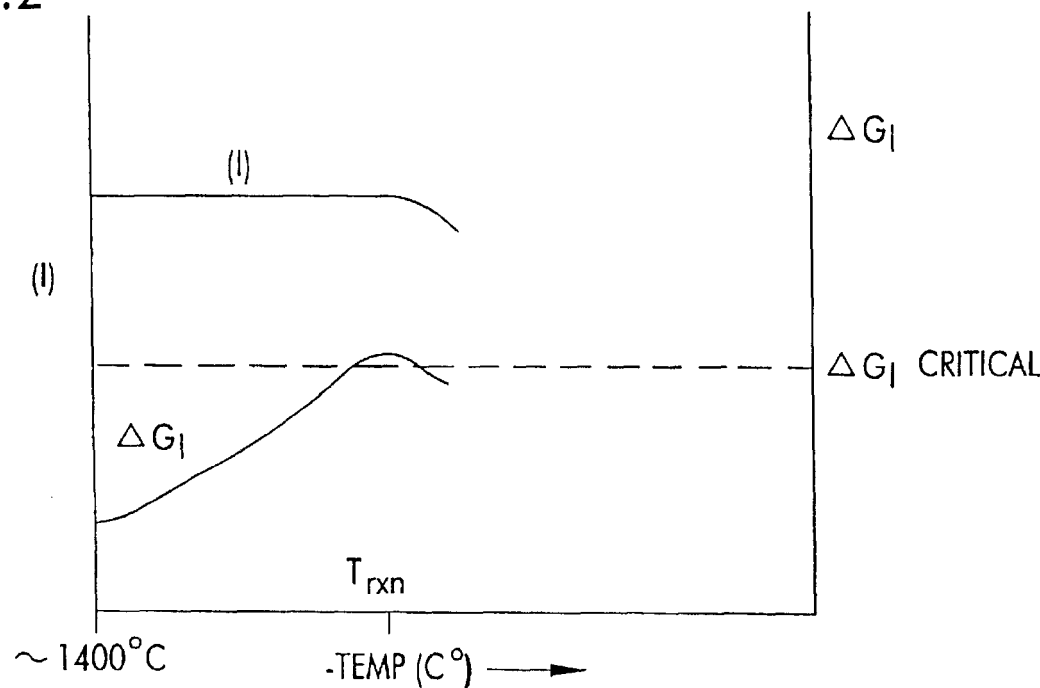


FIG. 3

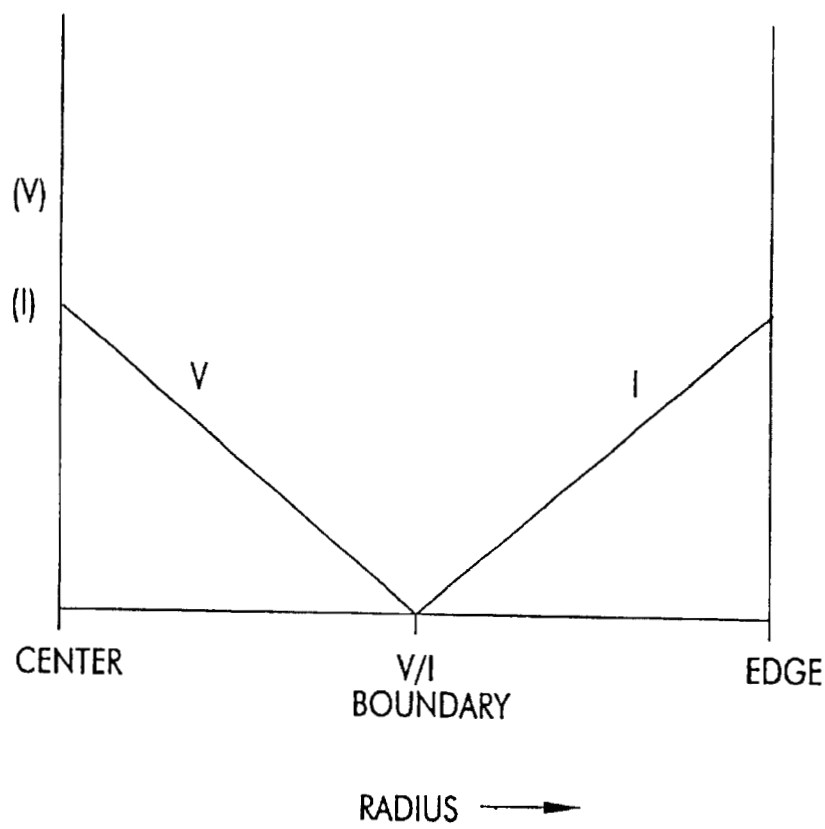
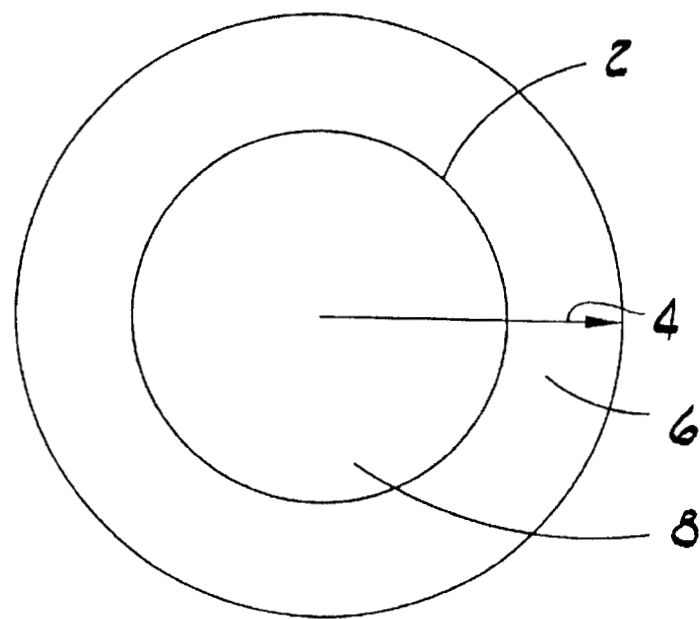


FIG. 4



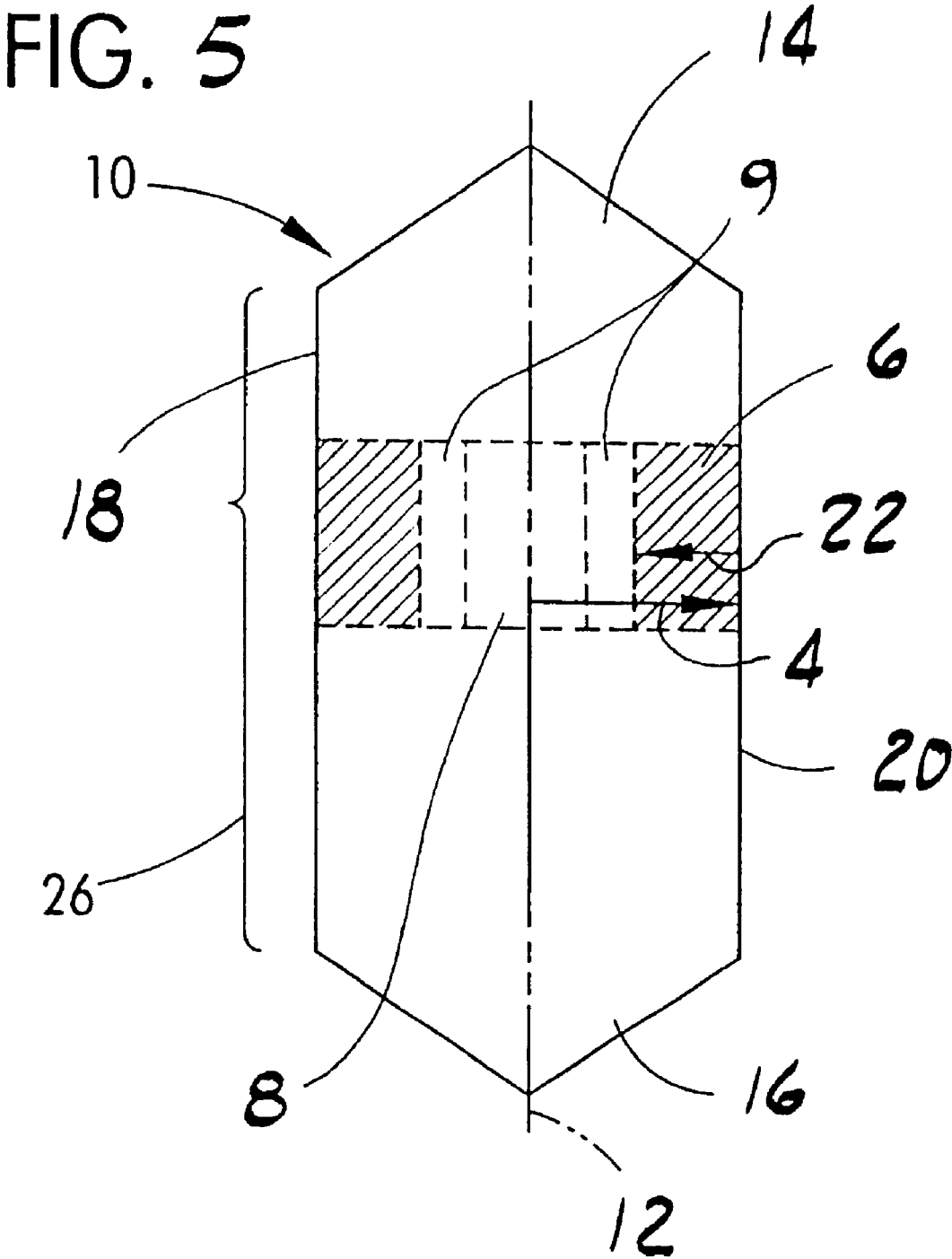
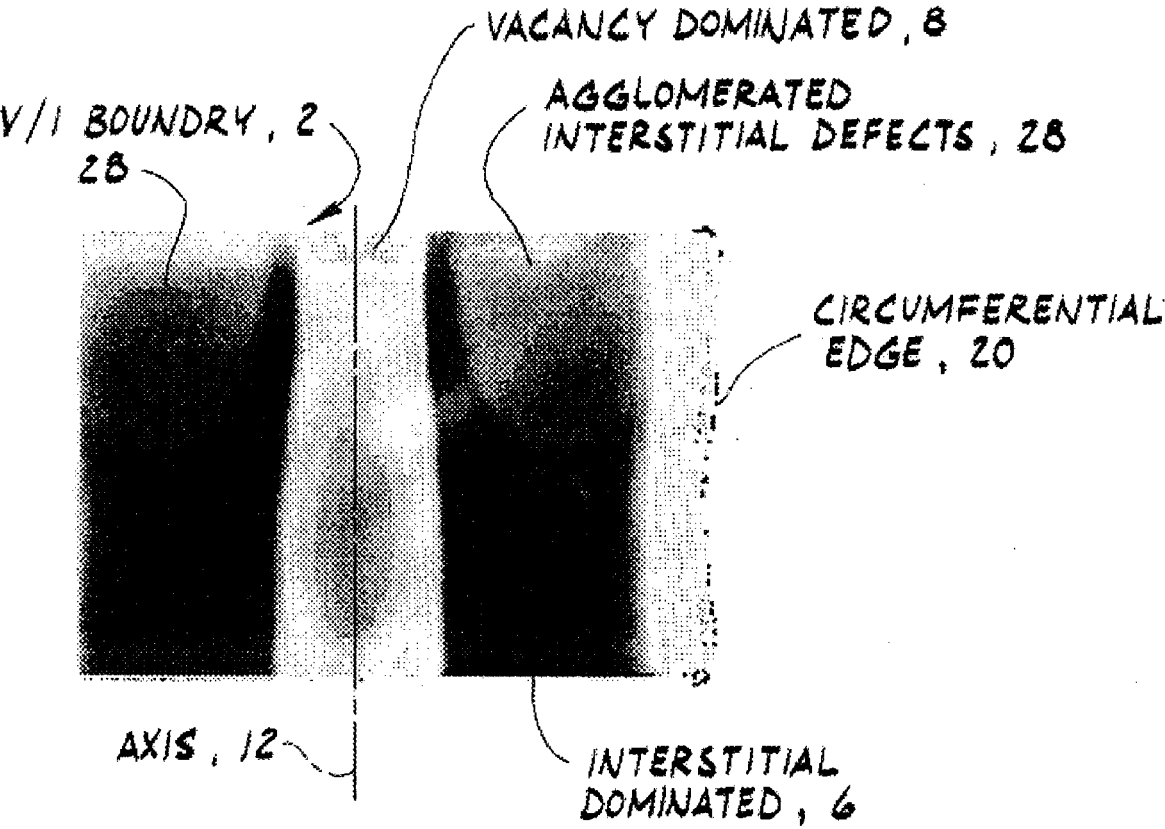
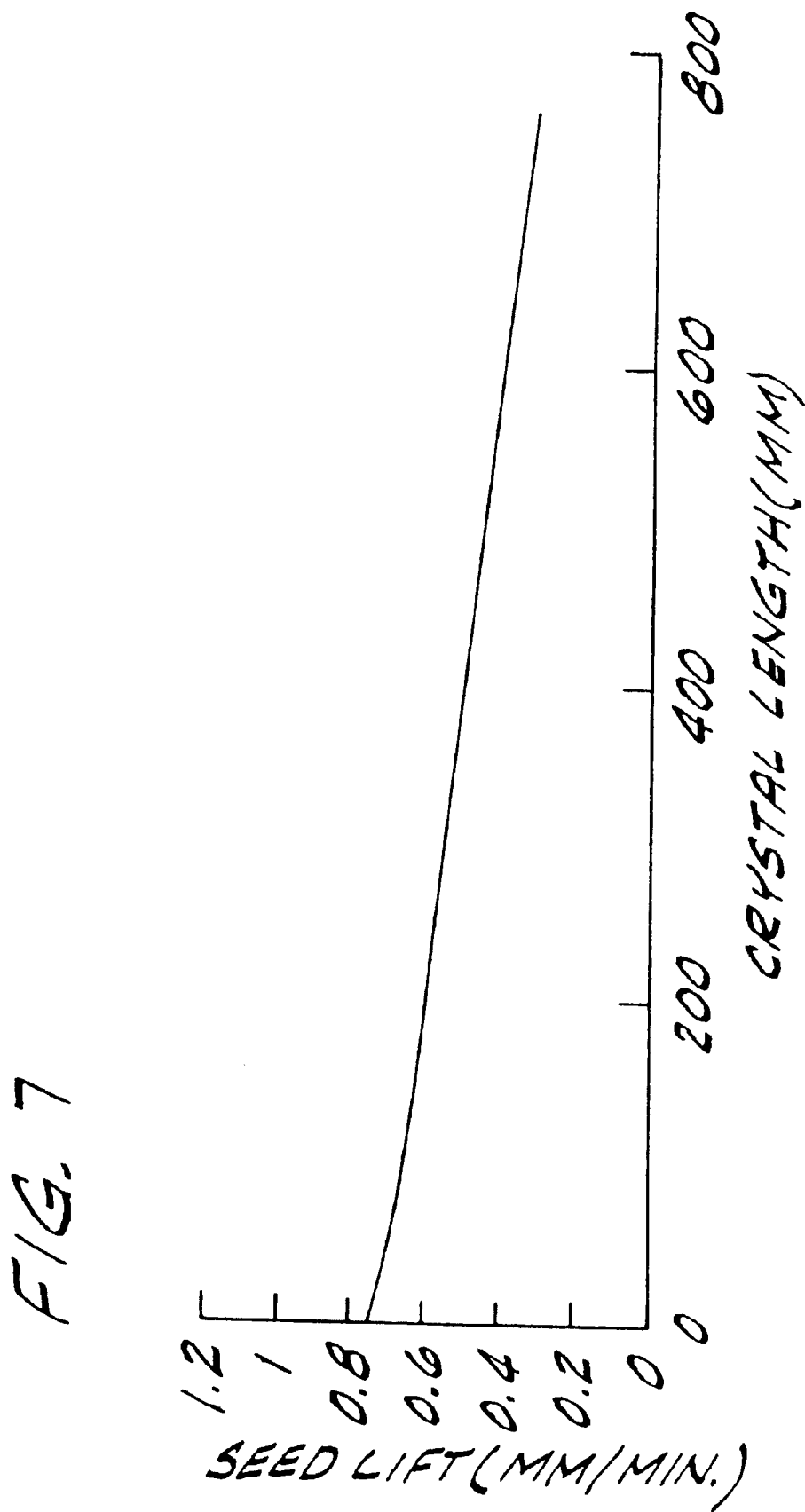


FIG. 6





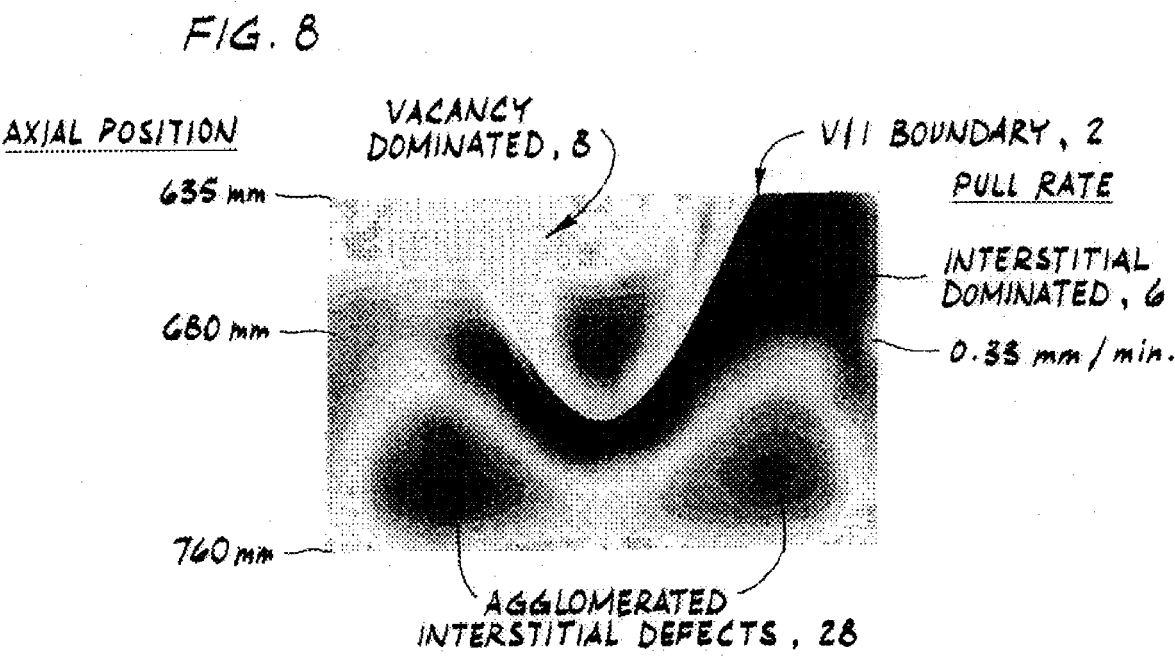




FIG. 9

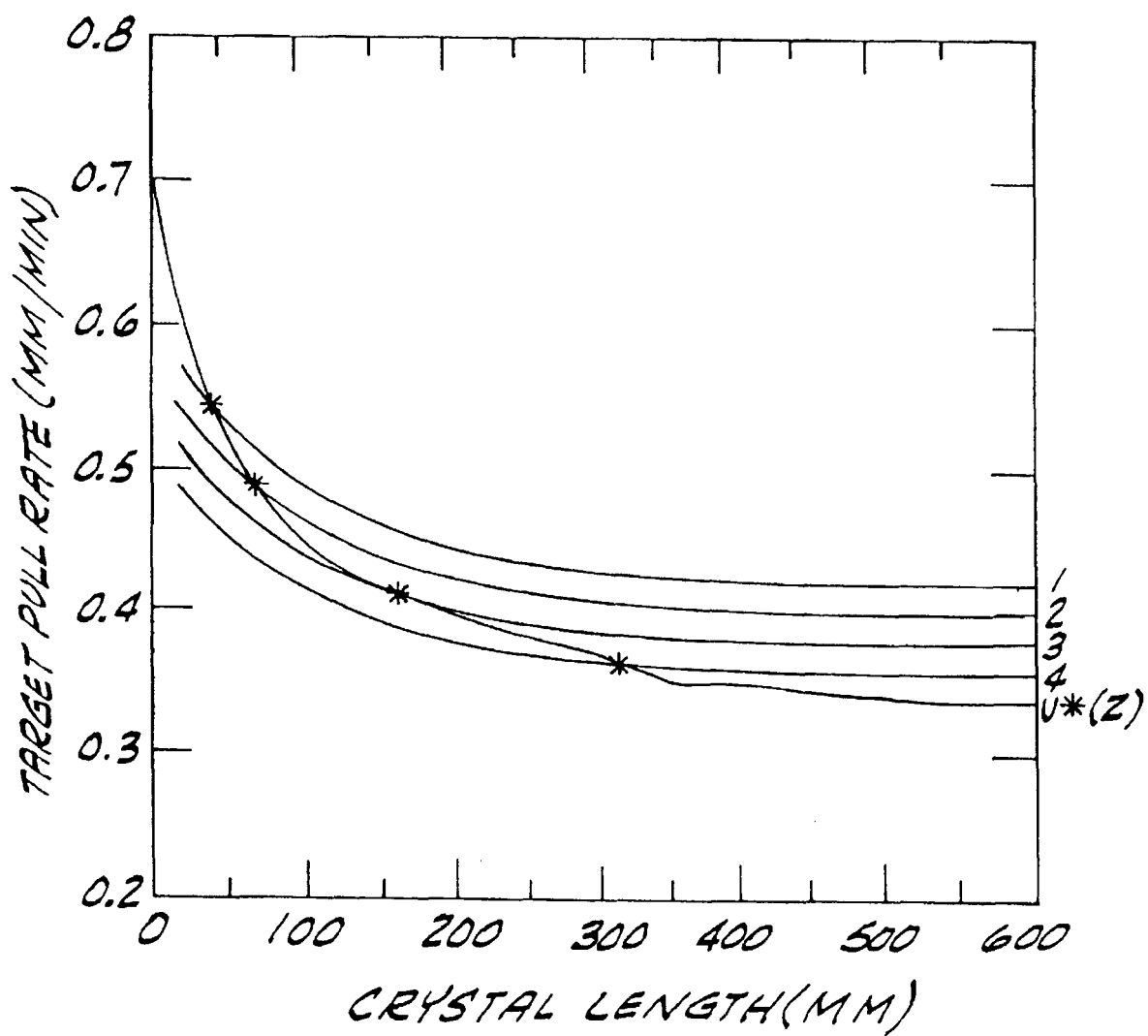


FIG. 10

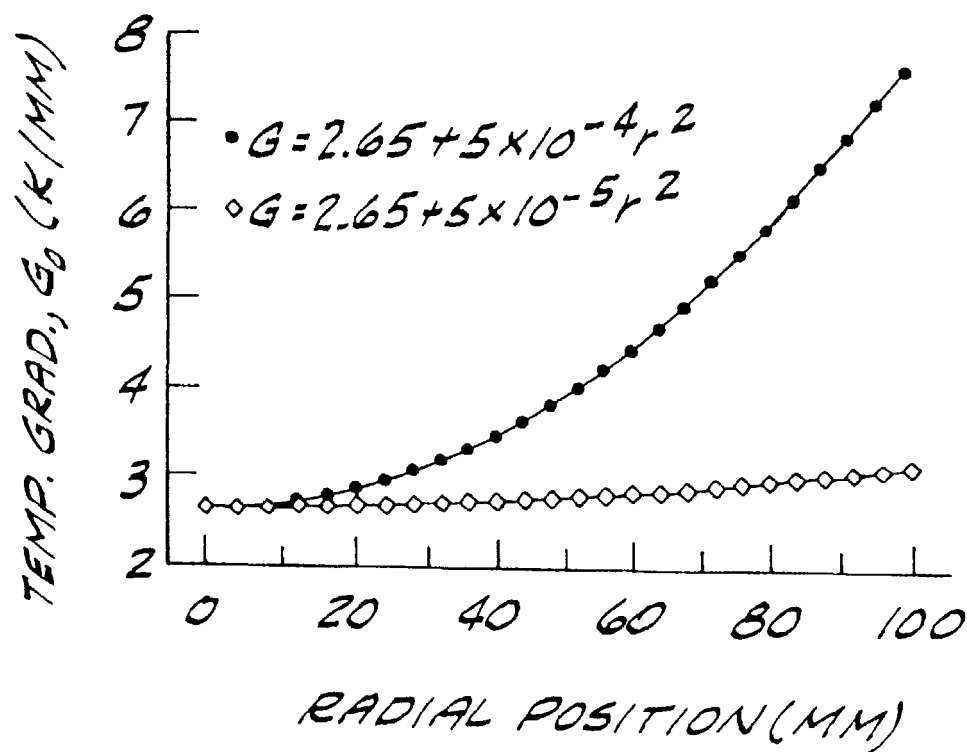
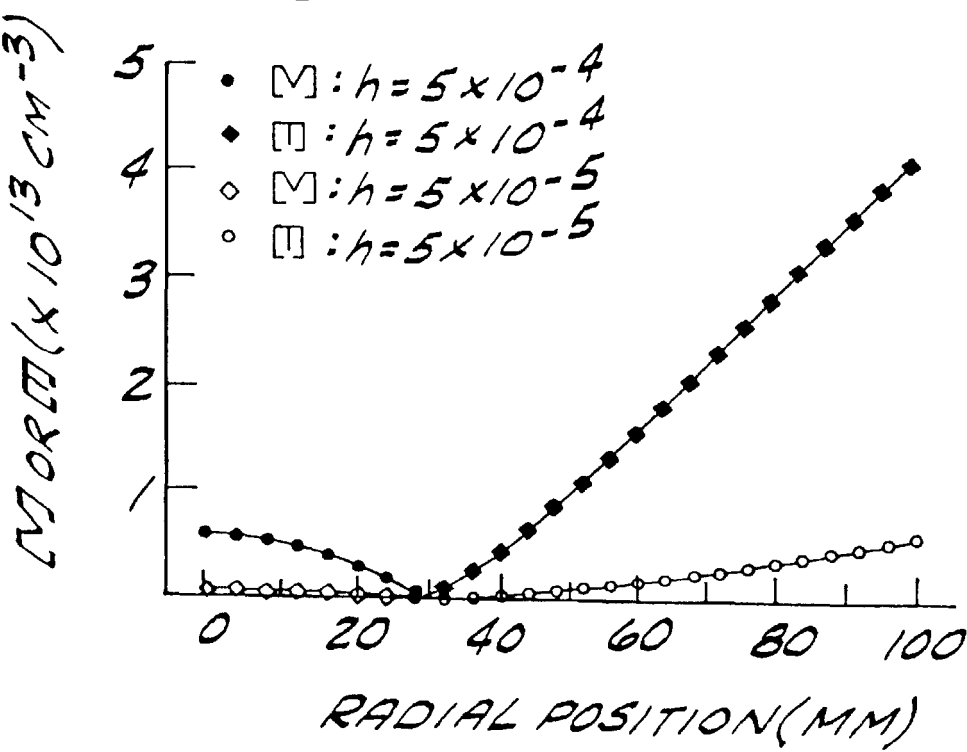


FIG. 11



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FIG. 12

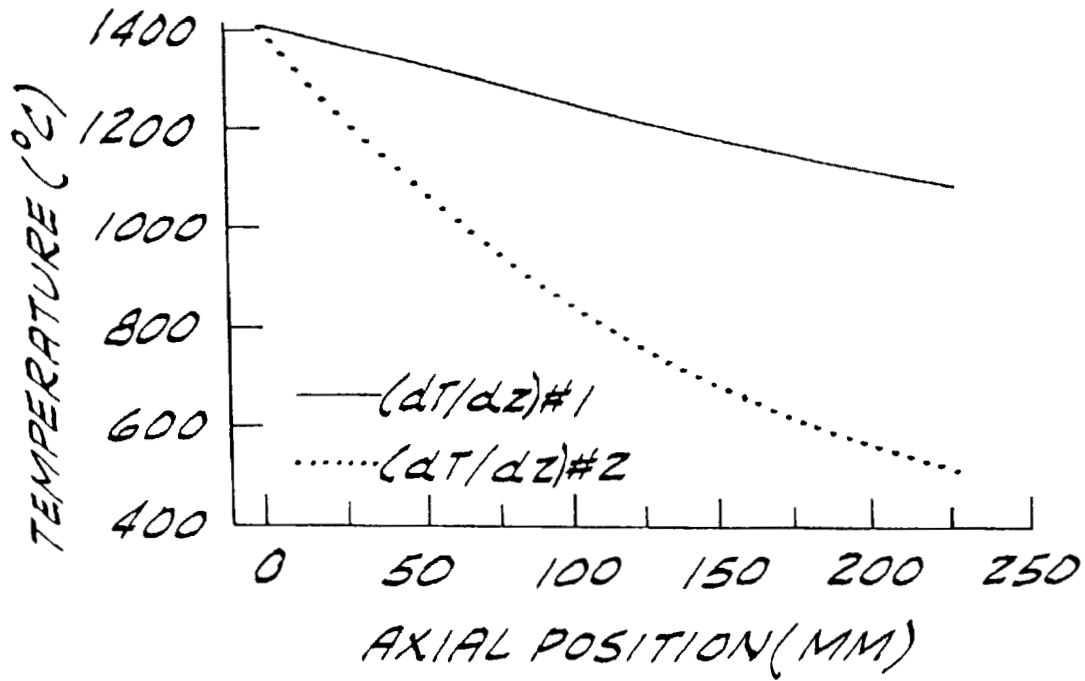
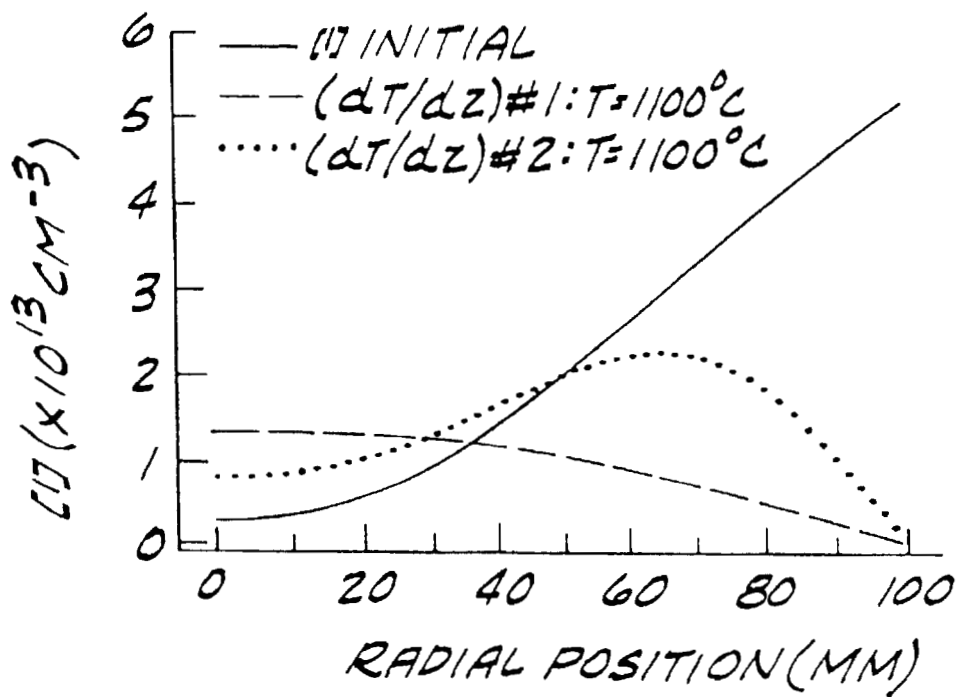


FIG. 13



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FIG. 14

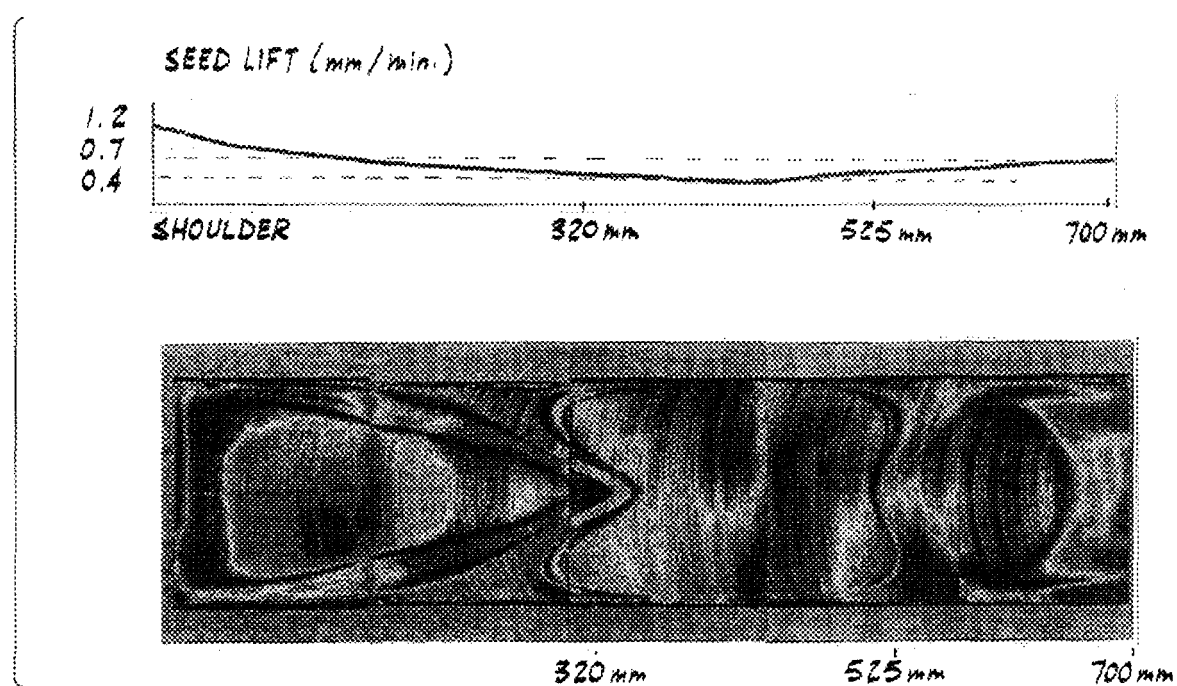


FIG. 15

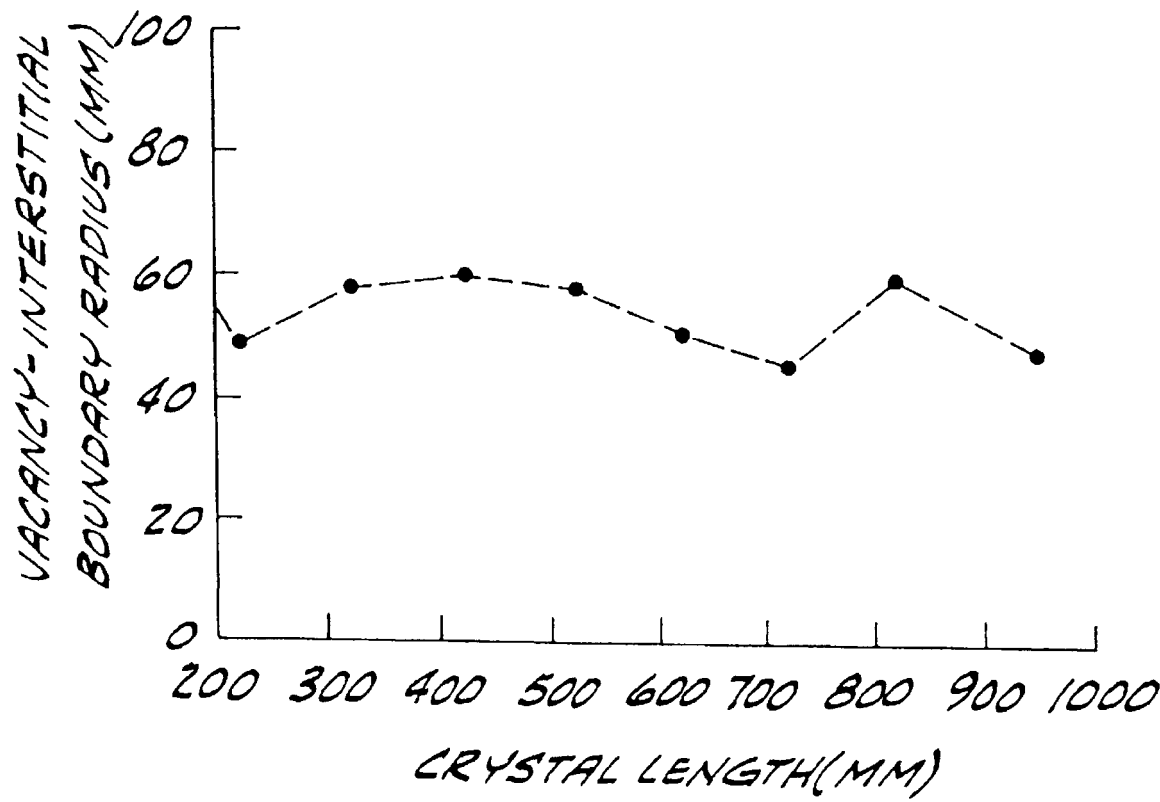


FIG. 16a

